

Listing outcomes + Permutations/combinations

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Worked example

There are 2 ways of doing task A .
There are 5 ways of doing task B .
I want to do both tasks.
Find the total number of ways the two tasks can be done.

Your turn

There are 3 ways of doing task A .
There are 4 ways of doing task B .
I want to do both tasks.
Find the total number of ways the two tasks can be done.

12

Worked example

List all the ways of arranging the letters in the word:

CAT

Your turn

List all the ways of arranging the letters in the word:

DOG

DOG

DGO

GDO

GOD

ODG

OGD

Worked example

List all the ways of arranging the letters in the word:

BEAR

Your turn

List all the ways of arranging the letters in the word:

FISH

<i>FISH</i>	<i>IFSH</i>	<i>SFIH</i>	<i>HFIS</i>
<i>FIHS</i>	<i>IFHS</i>	<i>SFHI</i>	<i>HFSI</i>
<i>FSHI</i>	<i>IHFS</i>	<i>SHFI</i>	<i>HIFS</i>
<i>FSIH</i>	<i>IHSF</i>	<i>SHIF</i>	<i>HISF</i>
<i>FHIS</i>	<i>ISHF</i>	<i>SIFH</i>	<i>HSFI</i>
<i>FHSI</i>	<i>ISFH</i>	<i>SIHF</i>	<i>HSIF</i>

Worked example

I flip a coin and then roll a six-sided die.

List the possible outcomes.

Your turn

I flip a coin and then roll a 4-sided die.

List the possible outcomes.

H1

H2

H3

H4

T1

T2

T3

T4

Worked example

I flip a coin and then roll a six-sided die.
How many possible combinations are there?

Your turn

I flip a coin and then roll a 4-sided die.
How many possible combinations are there?

8

Worked example

The first five positive integers are 1, 2, 3, 4, 5.

I choose two numbers from this list.

Write down all possible combinations of two numbers I can choose.

Your turn

The four square numbers are 1, 4, 9, 16.

I choose two numbers from this list.

Write down all possible combinations of two numbers I can choose.

1, 4

1, 9

1, 16

4, 9

4, 16

9, 16

Worked example

At a restaurant, there are 4 choices for starters and 2 choices for mains.

A meal consists of one starter and one main.

How many different meals are possible?

Your turn

At a restaurant, there are 3 choices for starters and 5 choices for mains.

A meal consists of one starter and one main.

How many different meals are possible?

15

Worked example

There are 20 girls and 16 boys in a tennis club.

For a mixed doubles match, 1 boy and 1 girl form a team.

How many different teams can be formed?

Your turn

There are 10 girls and 32 boys in a tennis club.

For a mixed doubles match, 1 boy and 1 girl form a team.

How many different teams can be formed?

320

Worked example

There are 59 girls and 78 boys in Year 13 at a school.

One girl is chosen for the role of Head Girl.

A different girl is chosen for the role of Deputy Head Girl.

One boy is chosen for the role of Head Boy.

A different boy is chosen for the role of Deputy Head boy.

How many different ways can this be done?

Your turn

There are 95 girls and 87 boys in Year 13 at a school.

One girl is chosen for the role of Head Girl.

A different girl is chosen for the role of Deputy Head Girl.

One boy is chosen for the role of Head Boy.

A different boy is chosen for the role of Deputy Head boy.

How many different ways can this be done?

66814260

Worked example

There are 24 boys and 20 girls in a class.

The teacher will pick three students from the class and write their names in a list in order.

The order will be either:

- Boy, girl, boy
- Girl, boy, girl

How many different lists can be written?

Your turn

There are 12 boys and 10 girls in a class.

The teacher will pick three students from the class and write their names in a list in order.

The order will be either:

- Boy, girl, boy
- Girl, boy, girl

How many different lists can be written?

2400

Worked example

There are 34 men in a group.
How many different pairs can be formed?

Your turn

There are 17 men in a group.
How many different pairs can be formed?

136

Worked example

I have a line of 10 light bulbs.
Each bulb can be ON or OFF.

How many different possibilities
are there for the line of lights?

Your turn

I have a line of 5 light bulbs.
Each bulb can be ON or OFF.

How many different possibilities
are there for the line of lights?

32

Worked example

Bag A contains four counters, labelled 2, 3, 5 and 7

Bag B contains five counters, labelled 1, 4, 9 and 16 and 25

A counter is taken from each bag at random and the numbers are added together.

Draw a sample space to show all possible scores.

Your turn

Bag A contains four counters, labelled 3, 5, 7 and 9

Bag B contains five counters, labelled 1, 8, 27 and 64

A counter is taken from each bag at random and the numbers are added together.

Draw a sample space to show all possible scores.

		Bag A				
Bag B	+	3	5	7	9	
	1	4	6	8	10	
	8	11	13	15	17	
	27	30	32	34	36	
	64	67	69	71	73	

Worked example

Two four-sided dice are rolled.
The numbers on the two dice are multiplied together.
Draw a sample space of the all the possible products.

Your turn

Two six-sided dice are rolled.
The numbers on the two dice are multiplied together.
Draw a sample space of the all the possible products.

		Roll 1					
Roll 2	×	1	2	3	4	5	6
	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18
	4	4	8	12	16	20	24
	5	5	10	15	20	25	30
	6	6	12	18	24	30	36

Worked example

How many ways can the letters
be arranged in:

DOG

FISH

ZEBRA

Your turn

How many ways can the letters
be arranged in:

SALMON

720

Worked example

How many ways can the letters be arranged in:

STALL

ERROR

SESSIONS

Your turn

How many ways can the letters be arranged in:

DIDDLLED

210

Worked example

How many ways can the letters
be arranged in:

COFFEE

ISOSCELES

GIGGLING

Your turn

How many ways can the letters
be arranged in:

EXCELLENCE

37800

Worked example

There are 7 teachers, 3 of which are going to have some training. How many different combinations of teachers could go on the training?

Your turn

There are 8 teachers, 4 of which are going to have some training. How many different combinations of teachers could go on the training?

70